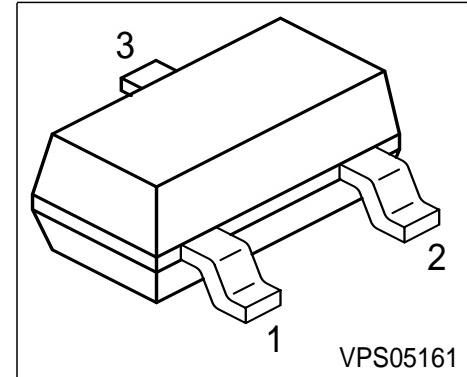


PNP Silicon AF Transistor

- For AF input stages and driver applications
- High current gain
- Low collector-emitter saturation voltage
- Low noise between 30 Hz and 15 kHz
- Complementary types: BCW60, BCX70 (NPN)



Type	Marking	Pin Configuration			Package
BCW 61A	BAs	1 = B	2 = E	3 = C	SOT23
BCW 61B	BBs	1 = B	2 = E	3 = C	SOT23
BCW 61C	BCs	1 = B	2 = E	3 = C	SOT23
BCW 61D	BDs	1 = B	2 = E	3 = C	SOT23
BCW 61FF	BFs	1 = B	2 = E	3 = C	SOT23
BCW 61FN	BNs	1 = B	2 = E	3 = C	SOT23
BCX 71G	BGs	1 = B	2 = E	3 = C	SOT23
BCX 71H	BHs	1 = B	2 = E	3 = C	SOT23
BCX 71J	BJs	1 = B	2 = E	3 = C	SOT23
BCX 71K	BKs	1 = B	2 = E	3 = C	SOT23

Maximum Ratings

Parameter	Symbol	BCW61	BCW61FF	BCX71	Unit
Collector-emitter voltage	V_{CEO}	32	32	45	V
Collector-base voltage	V_{CBO}	32	32	45	
Emitter-base voltage	V_{EBO}	5	5	5	
DC collector current	I_C		100		mA
Peak collector current	I_{CM}		200		mA
Peak base current	I_{BM}		200		
Total power dissipation, $T_S = 71^\circ\text{C}$	P_{tot}		330		mW
Junction temperature	T_j		150		$^\circ\text{C}$
Storage temperature	T_{stg}		-65 ... 150		

Thermal Resistance

Junction - soldering point ¹⁾	R_{thJS}	≤ 240			K/W
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Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

DC Characteristics

Collector-emitter breakdown voltage $I_C = 10 \text{ mA}, I_B = 0$	$V_{(BR)CEO}$ BCW61/61FF BCX71	32 45	- -	- -	V
Collector-base breakdown voltage $I_C = 10 \mu\text{A}, I_B = 0$	$V_{(BR)CBO}$ BCW61/61FF BCX71	32 45	- -	- -	
Emitter-base breakdown voltage $I_E = 1 \mu\text{A}, I_C = 0$	$V_{(BR)EBO}$	5	-	-	

¹For calculation of R_{thJA} please refer to Application Note Thermal Resistance

Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Collector cutoff current $V_{CB} = 32 \text{ V}, I_E = 0$	I_{CBO}	-	-	20	nA
$V_{CB} = 45 \text{ V}, I_E = 0$	BCX71	-	-	20	
Collector cutoff current $V_{CB} = 32 \text{ V}, I_E = 0, T_A = 150^\circ\text{C}$	I_{CBO}	-	-	20	μA
$V_{CB} = 45 \text{ V}, I_E = 0, T_A = 150^\circ\text{C}$	BCX71	-	-	20	
Emitter cutoff current $V_{EB} = 4 \text{ V}, I_C = 0$	I_{EBO}	-	-	20	nA
DC current gain 1) $I_C = 10 \mu\text{A}, V_{CE} = 5 \text{ V}$	h_{FE}	20	140	-	-
	h_{FE} -grp. A/G	30	200	-	
	h_{FE} -grp. B/H	40	300	-	
	h_{FE} -grp. C/J/FF	100	460	-	
DC current gain 1) $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}$	h_{FE}	120	170	220	
	h_{FE} -grp. A/G	180	250	310	
	h_{FE} -grp. B/H	250	350	460	
	h_{FE} -grp. C/J/FF	380	500	630	
DC current gain 1) $I_C = 50 \text{ mA}, V_{CE} = 1 \text{ V}$	h_{FE}	60	-	-	
	h_{FE} -grp. A/G	80	-	-	
	h_{FE} -grp. B/H	100	-	-	
	h_{FE} -grp. C/J/FF	110	-	-	

1) Pulse test: $t \leq 300\mu\text{s}$, $D = 2\%$

Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified.

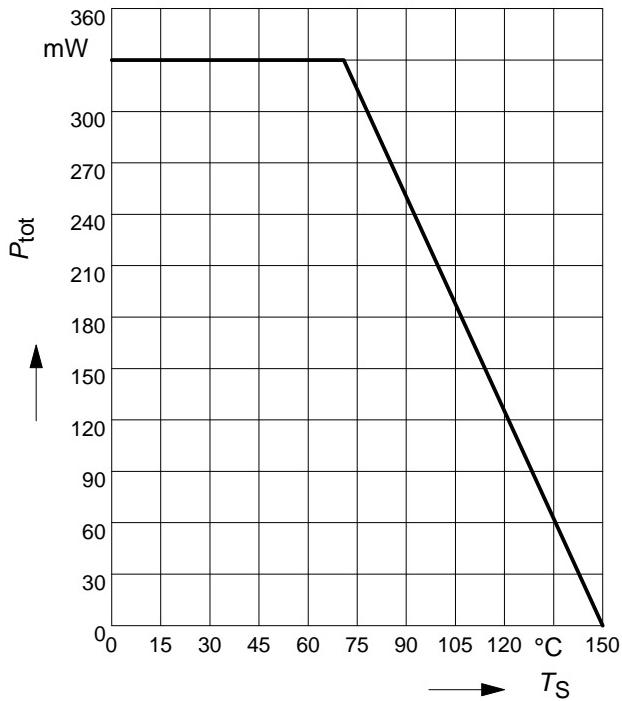
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Collector-emitter saturation voltage1) $I_C = 10 \text{ mA}, I_B = 0.25 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 1.25 \text{ mA}$	V_{CEsat}	-	0.12 0.2	0.25 0.55	V
Base-emitter saturation voltage 1) $I_C = 10 \text{ mA}, I_B = 0.25 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 1.25 \text{ mA}$	V_{BEsat}	-	0.7 0.83	0.85 1.05	
Base-emitter voltage 1) $I_C = 10 \mu\text{A}, V_{CE} = 5 \text{ V}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}$ $I_C = 50 \text{ mA}, V_{CE} = 1 \text{ V}$	$V_{BE(ON)}$	- 0.55 -	0.52 0.65 0.78	- 0.75 -	
AC Characteristics					
Transition frequency $I_C = 20 \text{ mA}, V_{CE} = 5 \text{ V}, f = 100 \text{ MHz}$	f_T	-	250	-	MHz
Collector-base capacitance $V_{CB} = 10 \text{ V}, f = 1 \text{ MHz}$	C_{cb}	-	3	-	pF
Emitter-base capacitance $V_{EB} = 0.5 \text{ V}, f = 1 \text{ MHz}$	C_{eb}	-	8	-	
Short-circuit input impedance $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}$	$h_{FE\text{-grp.}}$ A/G B/H C/J/FF D/K/FN	h_{11e}	- - - -	2.7 3.6 4.5 7.5	kΩ
Open-circuit reverse voltage transf.ratio $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}$	$h_{FE\text{-grp.}}$ A/G B/H C/J/FF D/K/FN	h_{12e}	- - - -	1.5 2 2 3	10^{-4}

1) Pulse test: $t \leq 300\mu\text{s}$, $D = 2\%$

Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified.

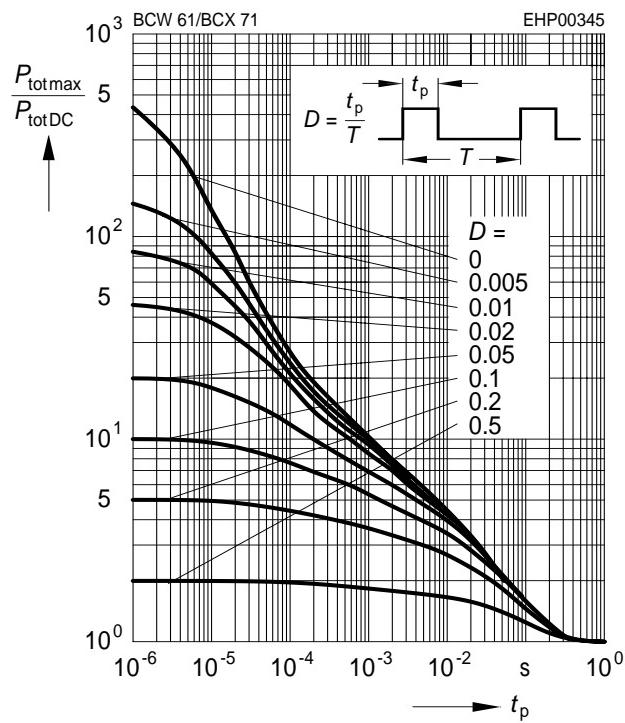
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Short-circuit forward current transf.ratio $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}$	$h_{FE\text{-grp.}}$ A/G	h_{21e} -	200	-	-
	B/H		260	-	
	C/J/FF		330	-	
	D/K/FN		520	-	
Open-circuit output admittance $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}$	$h_{FE\text{-grp.}}$ A/G	h_{22e} -	18	-	μS
	B/H		24	-	
	C/J/FF		30	-	
	D/K/FN		50	-	
Noise figure $I_C = 200 \mu\text{A}, V_{CE} = 5 \text{ V}, R_S = 1 \text{ k}\Omega,$ $f = 1 \text{ kHz}, \Delta f = 200 \text{ Hz}$	$h_{FE\text{-grp.}}$ A/K	F -	2	-	dB
	FF/FN		1	2	
Equivalent noise voltage $I_C = 200 \mu\text{A}, V_{CE} = 5 \text{ V}, R_S = 2 \text{ k}\Omega,$ $f = 10 \dots 50 \text{ Hz}$	$h_{FE\text{-grp.}}$ FF/FN	V_n -	-	0.11	μV

Total power dissipation $P_{\text{tot}} = f(T_S)$



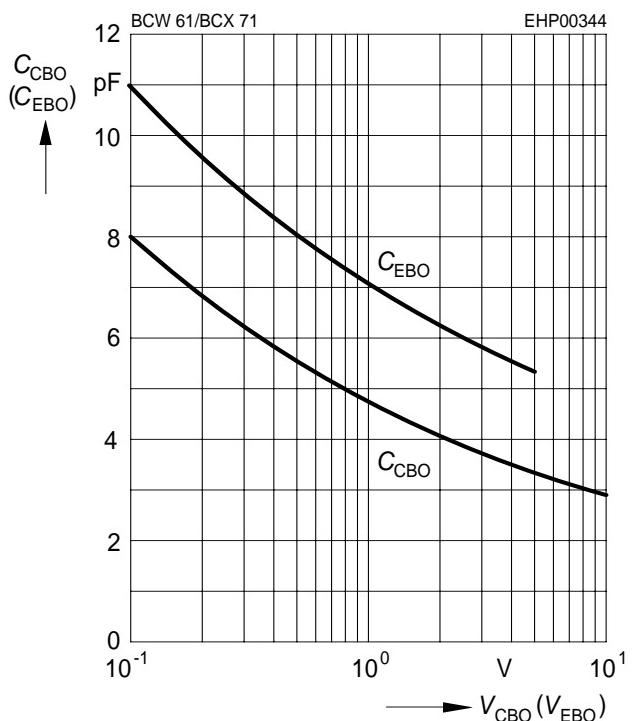
Permissible pulse load

$P_{\text{totmax}} / P_{\text{totDC}} = f(t_p)$



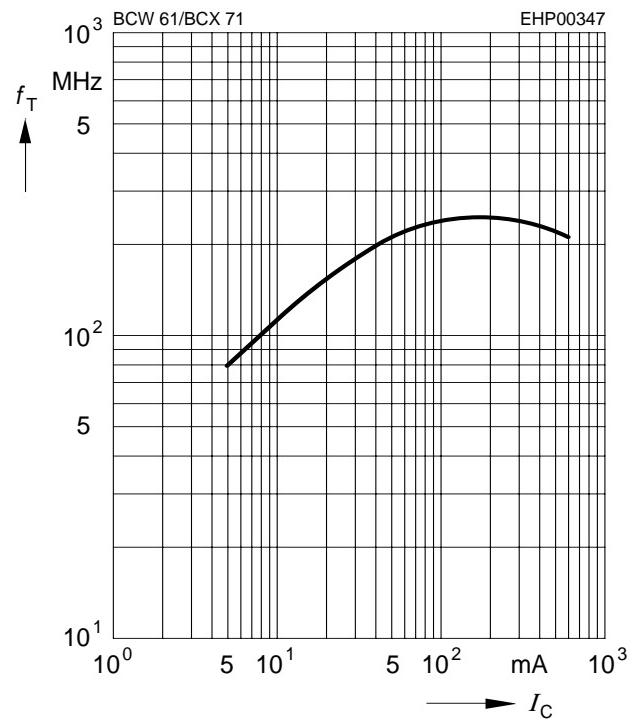
Collector-base capacitance $C_{\text{CB}} = f(V_{\text{CBO}})$

Emitter-base capacitance $C_{\text{EB}} = f(V_{\text{EBO}})$



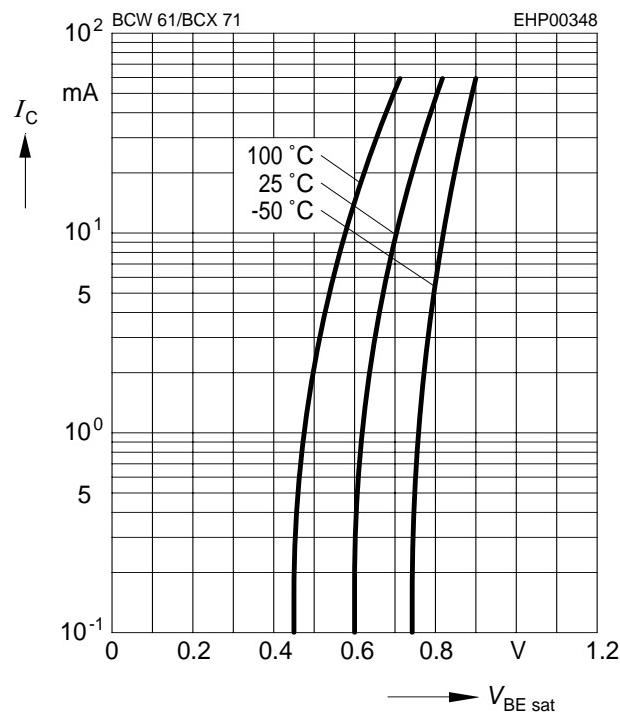
Transition frequency $f_T = f(I_C)$

$V_{\text{CE}} = 5\text{V}$



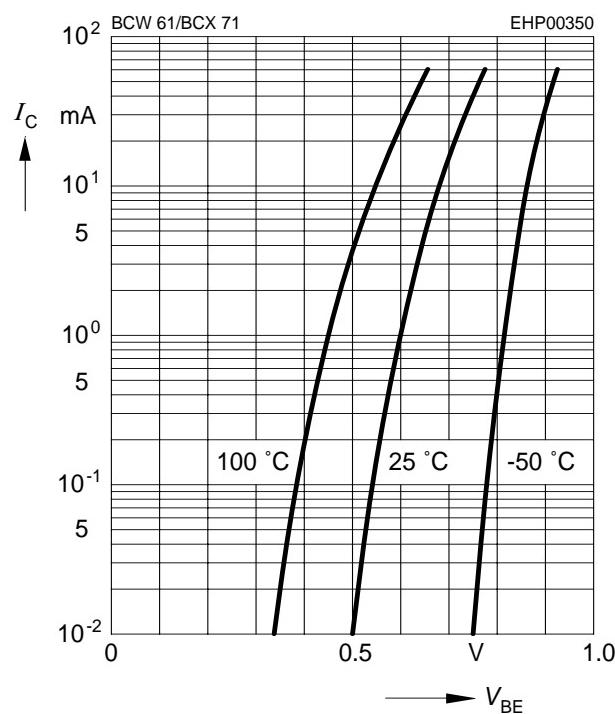
Base-emitter saturation voltage

$$I_C = f(V_{BEsat}), h_{FE} = 40$$

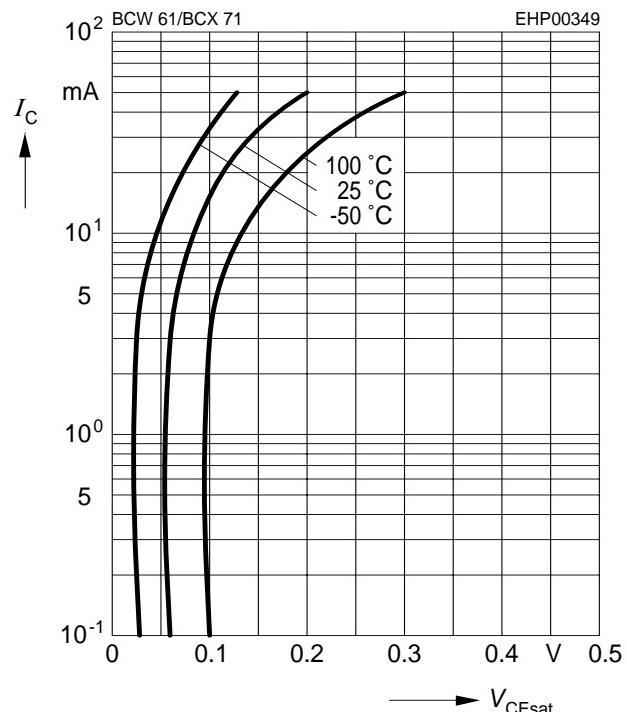


Collector current $I_C = f(V_{BE})$

$V_{CE} = 5V$

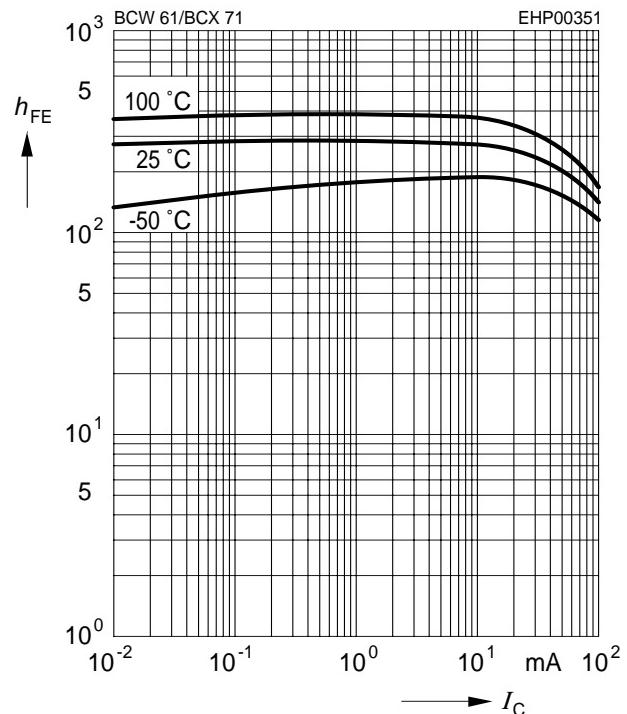

Collector-emitter saturation voltage

$$I_C = f(V_{CEsat}), h_{FE} = 40$$

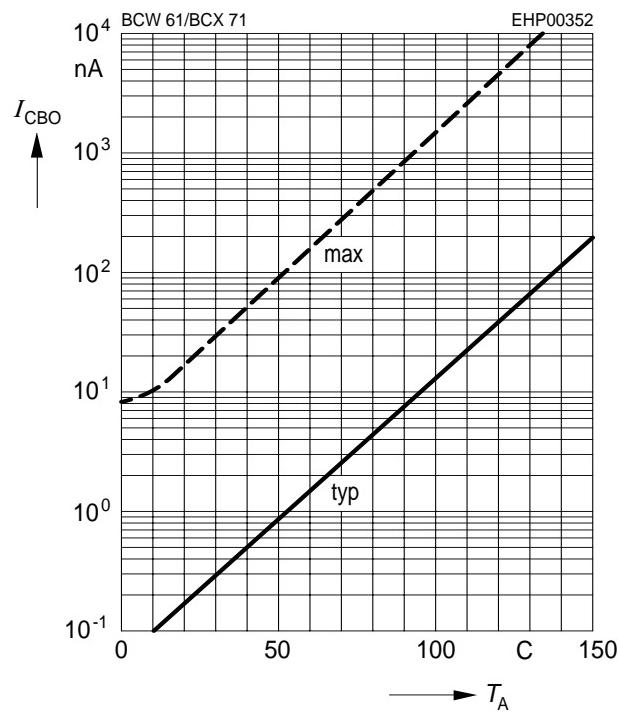


DC current gain $h_{FE} = f(I_C)$

$V_{CE} = 5V$

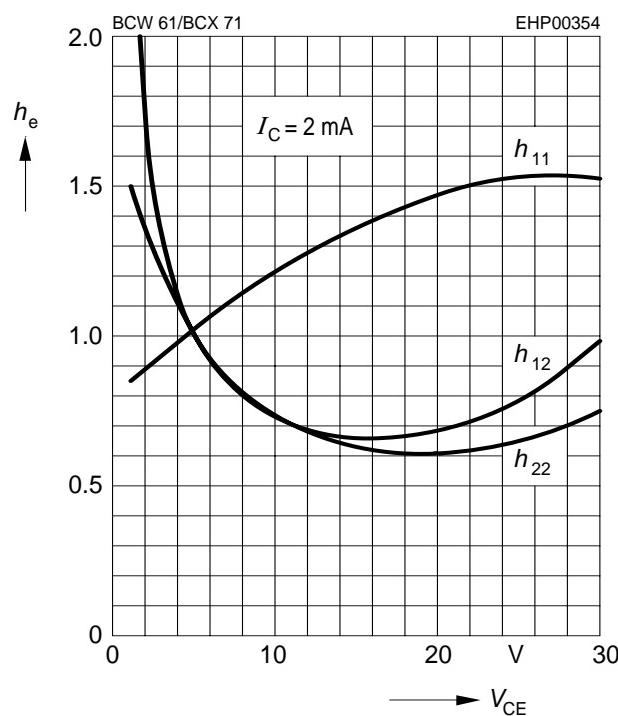
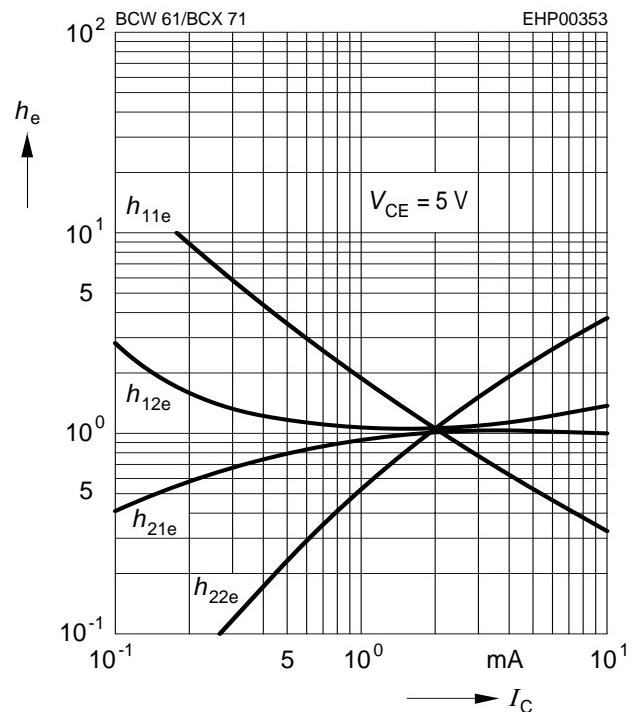


Collector cutoff current $I_{CBO} = f(T_A)$
 $V_{CB} = V_{CEmax}$

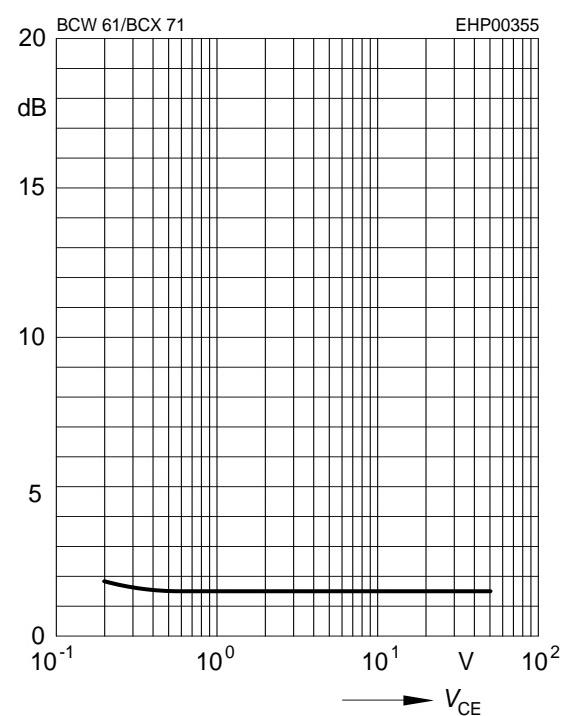


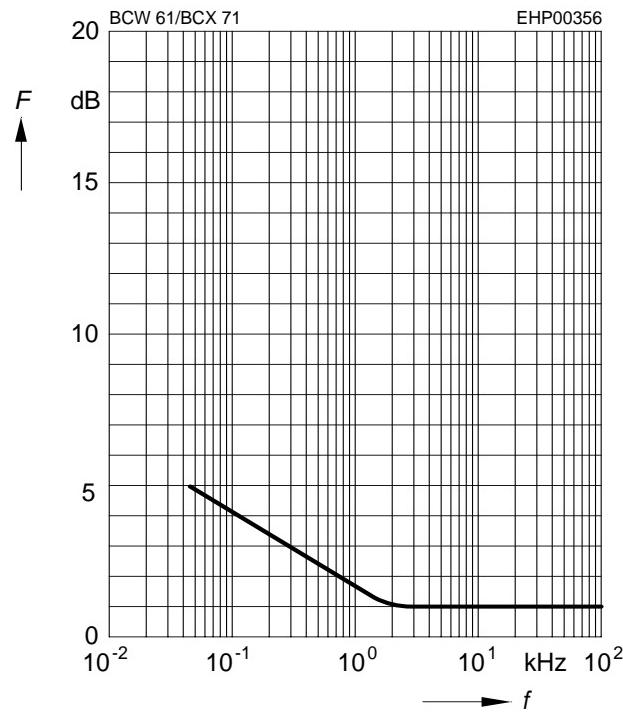
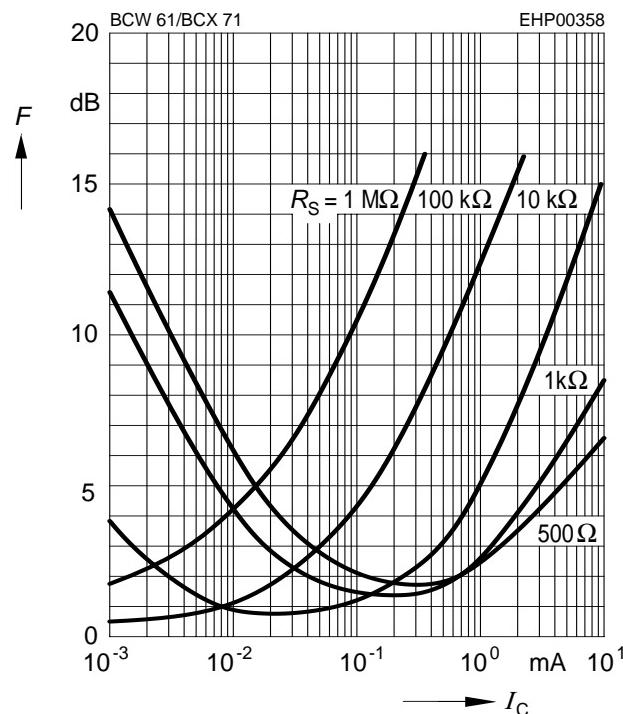
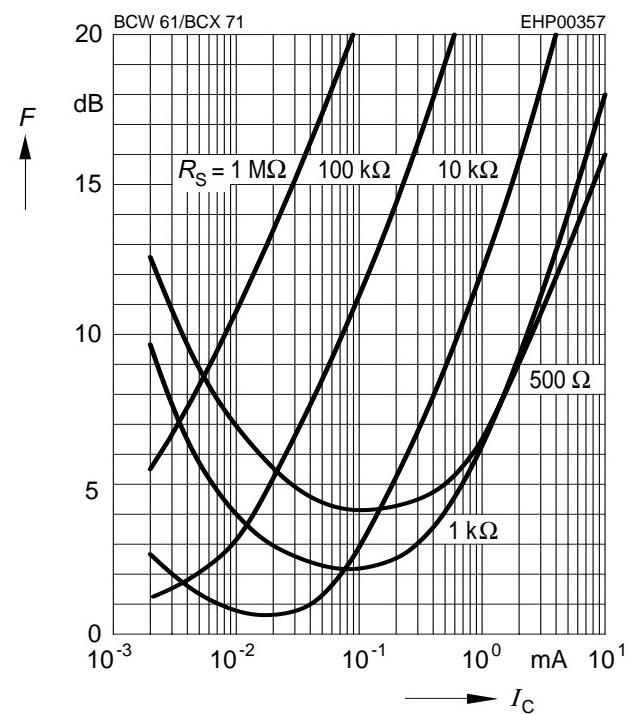
h parameter $h_e = f(V_{CE})$ normalized
 $I_C = 2\text{mA}$

h parameter $h_e = f(I_C)$ normalized
 $V_{CE} = 5\text{V}$



Noise figure $F = f(V_{CE})$
 $I_C = 0.2\text{mA}, R_S = 2\text{k}\Omega, f = 1\text{kHz}$



Noise figure $F = f(f)$
 $I_C = 0.2\text{mA}$, $V_{CE} = 5\text{V}$, $R_S = 2\text{k}\Omega$

Noise figure $F = f(I_C)$
 $V_{CE} = 5\text{V}$, $f = 1\text{kHz}$

Noise figure $F = f(I_C)$
 $V_{CE} = 5\text{V}$, $f = 120\text{Hz}$

Noise figure $F = f(I_C)$
 $V_{CE} = 5\text{V}$, $f = 10\text{kHz}$
